there need have been no more than two directions of movement, south-westerly and south-easterly; for the pebbles carried a part of their course in one direction may have been carried the rest of the way in the other, and so produced any resultant direction between the two; or materials carried by floating ice may have come in a far more crooked course (and the places of origin are all on the shores of the Baltic, or on streams flowing into it). The lower sedimentary bed, with only a couple of exceptions, contains, so far as now known, every kind of pebble found in the upper ones, so that no inferences can yet be drawn as to changes with time in the direction of transport. The main result would seem then to be, that the Kiel sediments have all come from more northern parts of the Baltic basin, and might have been carried chiefly by floating ice, without a climate so very different from the present one.

The author is highly to be commended for his liberality in printing his pamphlet of sixty-six large octavo pages at his own expense, and that, too, in a country where good European printing is particularly troublesome. The two maps might, perhaps, have been advantageously combined in one, if one of the two sets of lines had been of a different character (say, dotted or broken) or of another color; for the very object of cartographic representation is to show at one view as much as can possibly be distinguished clearly of any given subject, — to assemble for convenient comparison on one sheet as many as may be of the scattered facts of nature bearing upon any given point.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Spectra of comets observed in 1881. — P. Tacchini discusses the varying appearances presented by the spectra of the comets *b* and *c* 1881, and accompanies his remarks with an extensive series of nearly forty lithographed drawings illustrating the changes which occurred. These changes, for the most part, consist merely in variations of the brightness and diffusion of the observed bands, and not in any alterations of position. He gives also a single figure of the spectrum of Encke's comet, observed the same year, and a set of twenty drawings of the comets (*b* and *c*) themselves. The paper, with its accompanying plates, constitutes an important collection of observed data; and some slight discrepancies between these representations and those of other observers raise interesting questions. — (*Mem. soc. spettr. ital.*) C. A. Y. [263

Uranus. — Within the last few months, considerable attention has been paid to this planet, and a number of series of observations upon it have been published. Safarik (*Astr. nachr.*, 2505), Meyer (*Astr. nachr.*, 2524), and Schiaparelli (*Astr. nachr.*, 2526), all present the results of their measures made for the purpose of determining its diameter and ellipticity. The observations of Schiaparelli are the most numerous and complete. He finds for the equatorial diameter of the planet 3″.911, and, for the polar, 3″.555 (both reduced to the mean distance 19.1826). This gives the ellipticity of the planet $\frac{1}{11}$, nearly the same as that of Saturn. He also reports the existence, upon the planet's disk, of spots and changes of color, too faint, however, to admit of delineation by means of a telescope of only eight inches aperture. In fact, to have seen them at all with such an instrument is a most remarkable evidence of the wonderful clearness of the Italian sky. The writer of this notice also made a series of observations upon the same object, in May and June, with the twenty-three inch equatorial of the Princeton observatory. Markings upon the planet's disk were unmistakably visible as belts resembling those of Jupiter and Saturn. The equatorial diameter determined by the writer's measures is 4″.280, and the polar, 3″.974, giving an ellipticity of $\frac{1}{14}$. Mädler, in 1843, obtained 4″.304 and 3″.869 for the two diameters, and an ellipticity of $\frac{1}{10}$. There can no longer be any doubt that the planet has a rapid rotation nearly in the plane of the satellite-orbits. — C. A. Y. [264

MATHEMATICS.

Perimeter of the ellipse. — Mr. Thomas Muir, referring to a recent article by M. Mansion, infers that the following formula, which he has known for some time, for calculating approximately the perimeter of an ellipse, has not yet been published. Denoting as usual by *a* and *b* the semi-axes of the ellipse, the expression for the perimeter is

$$2\pi\sqrt[\frac{3}{2}]{\frac{a^{\frac{3}{2}}+b^{\frac{3}{2}}}{2}};$$

or, *the perimeter of an ellipse is approximately equal to the perimeter of a circle whose radius is the semi-cubic mean between the semi-axes of the ellipse.* — (*Mess. math.*, xii. no. 10.) T. C. [265

Calculus of variations. — The general problem of the calculus of variations is to find the variation of an *n*-tuple integral of a function of *n* independent variables, and of depending also upon a number of arbitrary functions of these variables, together with the differential coefficients of the functions. M. Picart in his paper, which he entitles *Theorie nouvelle du calcul des variations*, confines his attention to a triple integral containing only one arbitrary

function, and solves several of the more fundamental problems connected with the determination under various conditions of the variation of the integral. In particular, he shows how the problem of relative maxima or minima can be conducted to that of absolute maxima or minima. — (*Nouv. ann. math.*, Feb.) T. C. [266

PHYSICS.

(*Photography.*)

Photographing Reichenbach's flames. — The question of the actual existence of these flames, surrounding the poles of powerful magnets, has again been brought up for discussion in scientific circles. Numerous persons have claimed to be able to see them, and some even to be able to distinguish between the poles and the color of the flames. Reichenbach himself attempted to photograph them by the daguerrotype process, but was apparently dissatisfied with the results he obtained. Mr. William Brooks has taken the matter up, and thinks he has obtained actual impressions of the flames, by means of photography, on sensitive dry plates prepared especially for the purpose. In total darkness a perforated blackened card was placed one-eighth of an inch above the poles of a permanent horseshoe-magnet, and a sensitive plate placed an eighth of an inch above the card. With five minutes exposure he obtained a result; and this was repeated many times, the most remarkable thing being, that sometimes he obtained a positive and sometimes a negative image, under precisely the same conditions. Another curious effect obtained was, that some printed matter, which was under the wash of Indian ink used to blacken the card, was perfectly readable when the plate was developed. This latter result, however, was obtained on only one occasion. He also succeeded in obtaining prints through a glass plate on which were painted figures in black varnish. This was contrary to the experience of Reichenbach, who considered that the rays were not transmitted through glass. — W. H. P. [267

Hydrokinone. — Of this new developer, first introduced by Capt. Abney, Mr. Charles Ehrmann says, "The best results I have obtained with ten grains of hydrokinone to eight ounces of water, and caustic ammonia (1 to 7) added gradually as the development progressed. The negatives are of a non-actinic color, similar in tone to one slightly intensified with uranium and prussiate of potash; therefore the development need not be carried on very far, thus preserving all finer modulations. An injudicious amount of alkali will produce green fog." — (*Phot. times*, July.)

Of this same developer, Mr. Edwin Banks claims that it is much more powerful than pyro, and that it will bring out a fully developed picture with at least half the exposure that is necessary when pyro is employed. At first sight this seems strange, when it is observed how much more powerfully the latter absorbs oxygen; but the explanation probably lies in the fact that hydrokinone is more gradual in its action, and has a greater selective power, than pyro. With a collodio-bromide film, for instance, which is not so much protected from chemical action as one of gelatine, pyrogallic acts with such energy when mixed with an alkali, that the whole film is reduced immediately, and no image, or only a faint one enveloped in fog, appears: hence a powerful restrainer must be used to keep this action within bounds. A soluble bromide, which is the salt commonly used, has this effect, but, unfortunately, at the same time partially undoes the work which the light has done, rendering it necessary to give a longer exposure. But with hydrokinone no restrainer is necessary, unless a great error in exposure has been made. It does its work rapidly and cleanly, in this respect resembling ferrous oxalate. It does not discolor during development so much as pyro, and consequently does not stain the film so much, whilst full printing vigor is very easily obtained without having to resort to intensification. The color and general appearance of the negative are more like those of a wet plate, since the shadows remain quite clear, and free from fog. It seems almost impossible to fog a plate with it. One grain of hydrokinone to the ounce is strong enough for most purposes. With some samples of hard gelatine it is advisable to use two; but with most kinds and with collodion, one grain is sufficient. Two or three drops of a saturated solution of washing-soda to the ounce of the hydrokinone solution rapidly develops the image, and the addition of a few drops more to complete development is all that is needed. A soluble bromide acts very powerfully as a retarder and restrainer. With a mere trace added, development is very much slower. — (*Brit. journ. phot.*, July 6.) W. H. P. [268

ENGINEERING.

Sources of error in spirit-levelling. — Precise levelling in this country has been done by the U. S. lake survey, which has determined the elevation of all the great lakes with a probable error of less than one foot; by the coast and geodetic survey, which is carrying a line of levels across the continent from Chesapeake Bay to San Francisco; and by the Mississippi River commission, which has a line from the Gulf as far north as central Iowa, to be connected with Lake Michigan, and thence with the sea-level at New York. Mr. J. B. Johnson has been connected with some nine hundred miles of this work, and discusses the sources of error. He first classifies errors into compensating and cumulative. Then he treats them as, 1°, errors of observation, in the instrument or in the rod; 2°, errors from instrumental adjustment; 3°, errors from unstable supports; 4°, atmospheric errors, from wind, from tremulousness of the air caused by difference of temperature, and from variable refraction. He concludes, that, with good instruments and proper care, thirty miles of line should be duplicated a month with one Y-level and a target-rod, and all discrepancies brought within five-hundredths of a foot into the square root of the distance in miles; or with the U. S. precise levels and speaking-rods, reading three horizontal wires, one instrument should bring the discrepancies within two-hundredths of a foot into the square root of the distance in miles.

The Mississippi River levels have been well within this limit. — (*Journ. assoc. eng. soc.*, March.) C. E. G.

[269

GEOLOGY.

Lithology.

Gold in limestone. — According to Prof. C. A. Schaeffer, gold occurs in a ferruginous cretaceous limestone from Williamson county, Tex. This rock lies near the surface, and fifty-two samples procured *in situ* by him averaged $15.20. Twenty contained no gold, while thirty-two assayed from $1.00 up to $231.50 per ton. He regards the gold as having originally existed in the limestone in pyrite, which has since been removed and the gold locally concentrated. — (*Trans. Amer. inst. min. eng., Boston meeting.*) M. E. W.

[270

The Ottendorf basalt. — Rudolf Scharizer discusses the occurrence, microscopic and chemical composition, of this Silesian (Austria) basalt, its alteration, and contact phenomena with the grauwake-sandstone. The paper is quite full of chemical analyses. Olivine, somewhat serpentinized, is the predominating mineral, enclosed in a ground-mass of augite, magnetite, biotite, anorthite, nepheline, etc. The chemical analysis indicates that the rock is closely allied to the peridotites, if it does not belong to them. — (*Jahrb. geol. reich.*, xxxii. 471.)

The same journal contains an extended paper by Messrs. Teller and John, on the geological and lithological characters of the dioritic rocks of Klausen in the South Tyrol, a series of very diverse rocks including gabbros or norites. — (*Ibid.*, 589.) M. E. W.

[271

METEOROLOGY.

The rain-storm in Ontario on July 10. — The Canadian meteorological service has made a special investigation of this storm, which caused such unusual destruction in the vicinity of London, Ontario. Observations from over one hundred observers were received and studied. The isobaric curves show only such undulations as generally accompany showers and thunder-storms in the summer season; and there was nothing in the maps to warrant the expectation of any storm, beyond the 'local showers' which were officially predicted, and which occurred in other parts of Ontario. The fluctuations in barometric pressure were hardly appreciable, and there was but little wind. Indeed, the only peculiarity of the storm was the unaccountable and unexpected precipitation, which exceeded four inches where the maximum occurred. This amount was recorded in an elliptical area of country, extending in a direction about north-west and south-east, and covering a territory of about twenty by fifty miles. The devastation at London was due to the fact that the two branches of the Thames River, which there unite, approach from nearly contrary directions, the river flowing away nearly at right angles to the branches. The question is therefore raised, whether it would not be advisable to divert one of the branches, that it may meet the other at an acute angle, and thus lessen the probability of a repetition of the catastrophe. The need of an increased number of rainfall observers is pointed out, that means may be afforded for extensive study into the little-known subject of the course and causes of local rains. — (*Can. weath. rev.*, July.) W. U.

[272

GEOGRAPHY.

(*Alpina.*)

Ascent of Indrapura, Sumatra. — An account is recently published of the persevering and first successful attempt of Veth and Van Hasselt, several years ago (1877), to ascend this highest of the Sumatran volcanoes. They had to choose a way through the dense forest of the lower slopes, and over the sharp, loose rocks nearer the summit; and sudden heavy rains caused them much delay, so that eight days were spent in reaching the highest point, although the rim of the crater was gained a day earlier. Elephant-tracks were not found above 1,500 met., rhinoceros-tracks not above 2,600; but wild goats had been on the very summit. Above 2,500 met., large trees were absent; and above 3,000 only a few plants had found place to grow on the naked volcanic rocks. The barometer read 482.4 mm., and the thermometer, 8° C., corresponding to a height of about 3,700 metres. The surrounding country had the appearance of a uniform forest wilderness, occasionally broken by volcanic peaks and ranges, and showing a cultivated region by its lighter color in the distance near the coast. A deep crater lay within the sharp, ragged walls; several streams ran down to a pool at the bottom, a thousand metres below the rim, whence sulphurous vapors and clouds of steam rose into the great caldron. The volcano was in eruption in 1842, when described by Junghuhn. The descent was accomplished without serious difficulties. — (*Deutsche geogr. blätter*, vi. 1883, 130.) W. M. D.

[273

(*South America.*)

Bolivian rivers. — On the occasion of Dr. E. R. Heath's account of his exploration of the Beni and other rivers flowing from the Andes north-eastward to the Amazon system, Mr. C. R. Markham, secretary of the Royal geographical society, gave a general description of the region, part of which he had visited in 1853. The mountains in which the rivers rise are part of the eastern range of the Andes, rising into great peaks like Illimani and Illampu, to a height exceeding 21,000 feet, with fossiliferous silurian rocks up to their summits. To the west is the great interior plateau of the Titicaca basin; to the east, the rivers descend, bearing gold gravels to the great plains, covered with unbroken forest. This eastern region has been very little explored; and the india-rubber and cinchona bark gathered about the upper streams are carried westward over the mountains to the Pacific ports, rather than down the rivers to the Amazon and the Atlantic. Markham sketches the history of exploration here from the time of the Inca expedition in the fifteenth century to the expeditions of Maldonado down the Amarumayu in 1866, and Heath down the Beni in 1880; these being the only travellers who have followed the rivers down to their junction. Dr. Heath mapped the whole course

of the Beni with great care, taking astronomical observations, and measuring the width, depth, and velocity of the water. On reaching the Madeira, as the river is called below the junction of the Beni and Mamoré, he ascended the latter to Exaltacion, and then followed Yacuma, and crossed the country beyond its source to Reyes again on the Beni, where his return was celebrated by a public reception and a special mass. The people here were greatly excited over his report on the number of rubber-trees in the country he had passed through; and from 185 men engaged in collecting 104,000 pounds of rubber in 1880, the number increased to 644 in four months, and must now reach one or two thousand. From Reyes he ascended the Beni to La Paz. His report is very brief, and contains little beyond an itinerary; rapids and rocks are occasionally mentioned, and a few lakes were passed, but there is no material given toward a physical description of the country.—(*Proc. roy. geogr. soc.*, v. 1883, 313, map. [Dr. Heath's paper is also given in the *Bull. Amer. geogr. soc.*, 1882, no. 3.]) W. M. D. [274

BOTANY.

American smuts. — Farlow, in some notes on Ustilagineae, gives the first account of American Entylomata, his list including eight species, one only of which appears under another genus in earlier lists. Four of these are, for the present, described as new, though two may prove to be identical with species growing on the same host genera, in other countries. One is doubtfully considered to be a form of a European species; the balance occur also in the old world. Two American species of Cornu's new genus Doassansia — D. Farlowii Cornu and D. epilobii Farlow — are recorded; the former in the ovaries of Potamogeton, the latter in leaves of Epilobium. — (*Bot. gazette*, Aug.) W. T. [275

Fertilization of Leptospermum. — In a fourth paper on the indigenous plants of Sydney, E. Haviland considers the structure of the reproductive organs of this genus and its mode of fertilization. Cross-fertilization is regarded as probably the rule, brought about, 1°, by the difference in the times of maturing of the anthers and stigma; and, 2°, by changes in their relative positions. — (*Linn. soc. N. S. Wales; meeting* June 27.) [276

ZOÖLOGY.

Mollusks.

Astarte triquetra Conrad. — This minute and peculiar shell, recently rediscovered by Mr. Hemphill in Florida, but described by Conrad more than thirty years ago, proves to be a new form, Callicistronia, perhaps related to Tivela, with a small sinus in the pallial line, two large cardinal teeth in one valve, and one in the other. It is viviparous. More than fifty young ones were found in a single specimen, recalling the habit of Psephis. — W. H. D. [277

Anatomy of Urocyclus. — Dr. Paul Fischer has examined the soft parts of Urocyclus longicauda F. from Madagascar. The digestive tract resembles that of Parmacella and Limax. There is a large mucus-vesicle analogous to the vestibular prostate in Parmacella, Tennentia, and Ariophanta. Otherwise the reproductive organs resemble those of Helicarion, and a slug described in detail by Keferstein under the name of Parmarion in 1866, and which proves to be a true Urocyclus. This genus is African, while Parmarion is of Asiatic and East-Indian distribution. Urocyclus has an oxygnathous arcuate jaw, a rhachidian, thirty-nine lateral and thirteen uncinal teeth in one hundred and twenty-five rows. Dendrolimax of Heynemann appears to differ from Urocyclus merely in the absence of the mucus-vesicle, and will fall into synonymy. — (*Journ. de conchyl.*, xxii. 4.) W. H. D. [278

VERTEBRATES.

Reptiles.

Nerve-endings in the caudal skin of tadpoles. — The epidermis of the skin of tadpoles has two layers of cells. In the deeper cells, on the tail, appear peculiar bodies, first seen by Eberth (*Arch. mikros. anat.*, ii. 90) and Leydig (*Fortschr. naturf. ges. Halle*, 1879, taf. ix. fig. 32). The latter compared the bodies in question with the nettles of lasso-cells, giving to the cells containing the bodies the strange name of 'byssuszellen.' Pfitzner (*Morph. jahrb.* vii. 727) showed that these bodies are united with nerve-filaments, every one of the cells being so supplied. The nerves of the skin had been studied by Eberth (*l.c.*) and Hensen (*Virchow's arch.*, xxxi. 51; *Arch. mikros. anat.*, iv., 11). Canini and Gaule have studied the subject afresh, rectifying and supplementing the previous writers. The bodies in the basal epidermal cells appear as thick rods curved into bizarre and varying shapes. Each is connected with a nerve-filament (sometimes, but not always, as maintained by Pfitzner, two filaments run to one cell). The filaments descend through the gelatinous corium (cutis), to unite just below with a thick nucleated network of threads, which, from their reactions, are regarded as nervous tissue, and distinct from the cojacent plexus of connective-tissue corpuscles. This network, again, is connected with a deeper-lying, coarser plexus, corresponding to Ranvier's *plexus fondamentale*. These peculiar end-organs are not found, except in the tail: they are probably sensory, but Gaule hesitates to deny Leydig's interpretation. — (*Arch. anat. physiol., physiol. abth.*, 1883, 149.) C. S. M. [279

Birds.

Xenicidae, a new family. — On dissection of a specimen of Xenicus longipes and one of Acanthositta chloris, Mr. Forbes found the syrinx to be strictly mesomyodian. On account of this, the long tenth primary and the non-bilaminate tarsus, the birds are removed from the vicinity of Sitta as a family, Xenicidae, of non-oscinine Passeres in the vicinity of the Pittidae. — (*Proc. zoöl. soc. Lond.*, 1882, 569.) J. A. J. [280

Anatomy of the todies. — After a careful examination of the structure of this group, Mr. Forbes concludes that the todies are an isolated form of anomalogonatous birds, with no clear affinity to any living group. He therefore proposes to raise them to the group Todiformes, equivalent to the Passeri, or Piciformes.—(*Proc. zoöl. soc. Lond.*, 1882, 443.) J. A. J. [281

Illinois birds. — Nehrling continues his annotated list of Illinois birds in the full and learned manner so distinctive of German work. The present instalment contains thirty-nine species, from the bobolink to the great horned owl inclusive.—(*Journ. f. ornith.*, xxxi. 84.) J. A. J. [282

Mammals.

The os intermedium of the foot. — Dr. Karl Bardeleben gives a *résumé* of his observations upon the bones of the foot. A well-developed intermedium is present in many species of marsupials, but not in all. Its presence in a given species does not always imply its existence in closely allied species. For example: it occurs in Chironectes variegatus, but not in C. palmatus. The bone varies in size from one centimetre to a fraction of a millimetre. It does not exist in marsupials of which the hand has undergone regressive alterations, e.g., Halmaturus Bennetti, H. giganteus, etc. The separation of an intermedium is indicated in the monotremes, many edentates, as well as in the genera Elephas, Hippopotamus, and Tapirus, by a fissure, more or less deep, in the astragalus. Dr. Bardeleben suggests the name 'os trigonum' for the bone in question. — (*Zool. anz.*, no. 139.) F. W. T. [283

Odontoblasts and dentine. — R. R. Andrews has studied the development of teeth in pig embryos, and publishes the remarkable conclusion that the odontoblasts entirely disappear, forming the matrix of the dentine, and have nothing to do with the dentinal fibrils, which he claims arise from deeper layers, probably from nerve-fibres. (We are not prepared to agree with these views.) — (*N. E. journal of dentistry*, ii. 193.) C. S. M. [284

(*Man.*)

Measurements of the depth of sleep. — Two of Vierordt's pupils, Mönninghoff and Piesbergen, have made the depth of sleep the subject of an investigation. They worked upon the principle that the depth of sleep is proportional to the strength of the sensory stimulus necessary to awaken the sleeper, that is, to call forth some decisive sign of awakened consciousness. As a sensory stimulus they made use of the auditory sensation produced by dropping a lead ball from a given height. The strength of the stimulus was reckoned, in accordance with some recent investigations of Vierordt, as increasing, not directly as the height, but as the 0.59 power of the height. For a perfectly healthy man, the curve which they give shows that for the first hour the slumber is very light; after 1 hour and 15 minutes, the depth of sleep increases rapidly, and reaches its maximum point at 1 hour and 45 minutes; the curve then falls quickly to about 2 hours 15 minutes, and afterwards more gradually. At about 4 hours 30 minutes, there is a second small rise which reaches its maximum at 5 hours 30 minutes, after which the curve again gradually approaches the base line until the time of awakening. Experiments made upon persons not perfectly healthy, or after having made some exertion, gave curves of a different form. — (*Zeitsch. f. biol.*, xix. 114.) W. H. H. [285

ANTHROPOLOGY.

Notes on Mitla. — In July, 1881, Mr. Louis H. Aymé visited the ruins of Mitla, which lie in Oaxaca directly south of Vera Cruz. Mitla is not so grand, so magnificent, as Uxmal; but it has a beauty of its own, as it nestles quietly at the foot of the mighty mountains, the ruins of grim 'Fortin' standing sharp against the evening sky; and, as the sun sinks, one might fancy he heard the weird chant of the priests, the lament of the mourners for the dead who rest in Lyobaa, the Centre of Rest. Appended to M. Aymé's itinerary is a translation by Mr. S. Salisbury, jun., of the description of Mitla, by Francisco de Burgoa, written in 1674. Then follows a report of the various buildings constituting the north and south groups, which for detailed statement and brevity is a model archeological document. Mr. Aymé is able to correct some of the errors of his predecessors. It is gratifying to quote the following: "The buildings are carefully looked after by the government, and have an intelligent guardian in the person of Don Felix Juero." Comparing the present account with Burgoa's, Mr. Aymé concludes that in 1644 the ruins were practically as they are to-day. — (*Proc. Amer. antiq. soc.*, ii. 82.) J. W. P. [286

The Olmecas and the Tultecas. — Mr. Philipp J. J. Valentini gives some very cogent reasons for thinking that the sanguine hopes of the decipherers of American hieroglyphics will never meet the realization of those who unravelled the sacred languages of Egypt and Mesopotamia. Except for the wonderful similarity which early Mexican civilization bears to that of the ancient nations of the eastern hemisphere, only a fraction of the workers could have been induced to undertake the labor. The right way to treat these matters is to moderate our expectations. With such motive, the author then endeavors to fix the main epochs, and to inquire who were the Olmecas and the Tultecas. The former search results in fixing the dates of all we know concerning Mexican history between the years 232 and 1521 of the Christian era. Mexican history begins with the record of a race of giants, the Quinamé, or Quinametin, who are claimed to have been a people of Maya origin, found by the Nahuatls on the Atoyac River, when they were migrating southward. When the name of the Olmecas appears in the early Mexican records of the Nahoas, we must not hesitate to recognize in them that people east of Anahuac who spread along the Atlantic slopes and south through Yucatan, Tabasco, and the whole of Guatemala, and whom we designate to-day by the collective name of Maya. No nation, empire, or language of Tultecas ever existed. The Tultec exodus is shown to refer to the migrations of the Colhuas who shared with the Mexicans the rule of the uplands. Their journey to Culiacan was not from the Pueblos, but from the borders of the Gulf of Mexico. — (*Proc. Amer. antiq. soc.*, ii. 193–230.) J. W. P. [287

North-eastern Borneo and the Sulu Islands. — Although north-eastern Borneo is close to the Sulu group, there is a great difference in the people. The Sulus are Malays, with a considerable infusion of Arab and Chinese blood. The Bajaws, or sea-gypsies,

lead a nomadic life in their boats, each boat containing an entire household. The Sulus are divided into coast Sulus and the Orang Gumber, living among the hills, and they are much above the Bajaws in character. The latter are stronger in physique, but timid and treacherous. On the coast-line of Borneo is an extraordinary mixture. At Melapi, sixty miles up the Kina Batangan, are Sundyaks, Malays, Javanese, Sulus, Bajaws, Bugis, Chinese, Arabs, Klings, and many others; while of the Buludupies, the indigenous inhabitants, there are hardly any of pure blood left. These indigenes are an interesting people, their ancestry showing distinct signs of a Caucasian type. The rest of north-eastern Borneo is inhabited by tribes of the race styled Eriaans, Dusuns, or Sundyaks, who are of Dyak blood, with perhaps an infusion of Chinese. The Chinese language, dress, etc., are entirely lost, however. Slavery of a clan or feudal type is universal, and the Mohammedan religion prevails. The Sundyaks are divided into many tribes, some of which are gaining in power. *Cf.* i. **552.** — (*Proc. roy. geogr. soc.*, v. 90.) J. W. P. [288

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

PUBLIC AND PRIVATE INSTITUTIONS.

Dudley observatory, Albany, N.Y.

Comet b, 1883 (Brooks). — By means of observations secured at the Dudley observatory on Sept. 5, 9, and 18, I derived on the 19th the following parabolic elements, marked I. The remarkable similarity of these elements to those given by Schulhof and Bossert for the Pons comet of 1812 pointed unmistakably to their identity. The elliptic elements of the Pons comet (here marked II.) are transcribed from the memoir of Schulhof and Bossert (p. 150), except that they are reduced to the mean ecliptic and equinox of 1883.0, and a value of T, derived from observations of the present apparition, is substituted.

I.		II.	
T = 1884, Jan., 25.788 (G.M.T.).		T = 1884, Jan., 25.696 (G.M.T.).	
Node	254° 13′.6	Node	254° 8′.8
Node to perihelion	199 14 .4	Node to perihelion	199 12 .9
Inclination	74 47 .1	Inclination	74 03 .3
Log. q.	9.87944	Log. q.	9.88930
		Eccentricity	0.95527

The value of T in II. was determined by approximation from the observation of Sept. 5. The remaining observations do not indicate any important change in its value. The following ephemeris results from elements II. The geocentric positions are referred to the mean equinox of 1883.0.

Greenwich, 12 hours.	α	δ	Log. Δ	Light.
	h. m. s.	° ′		
Sept. 2	16 36 37	65 03.0	0.3725	.03
" 6	32 19	64 13.9	0.3648	.03
" 10	29 06	63 23.0	0.3569	.04
" 14	26 53	62 31.1	0.3487	.04
" 18	25 37	61 38.3	0.3400	.04
" 22	25 15	60 45.2	0.3310	.05
" 26	25 45	59 52.4	0.3215	.05
" 30	27 01	58 59.6	0.3115	.06
Oct. 4	29 06	58 07.5	0.3009	.06
" 8	31 57	57 16.5	0.2897	.07
" 12	35 32	56 26.5	0.2779	.08
" 16	39 52	55 37.6	0.2653	.08
" 20	44 56	54 49.9	0.2518	.09
" 24	50 47	54 03.3	0.2377	.10
" 28	57 25	53 17.8	0.2226	.12
Nov. 1	17 04 53	52 33.3	0.2065	.14
" 5	13 15	51 49.6	0.1893	.16
" 9	22 34	51 06.0	0.1708	.19
" 13	32 56	50 22.4	0.1512	.22
" 17	44 26	49 37.0	0.1302	.26
" 21	57 14	48 49.4	0.1077	.32
" 25	18 11 27	47 57.1	0.0836	.38
" 29	27 16	46 58.1	0.0580	.46
Dec. 3	44 50	45 43.2	0.0300	.57

In the light scale, .19 corresponds to that of discovery in 1812, and 1.00 to the time when the comet was reported as visible to the naked eye in the apparition of 1812. The places of the above ephemeris represent the observations already made within about 30″ in each co-ordinate, and with a very uniform minus value of 'c-o' throughout. This seems to be the fault of the elliptic elements. Any considerable change in the time of perihelion passage diminishes the discrepancy in one co-ordinate at the expense of the other.

It is remarkable that the present comet should have been picked up when its light ratio was six times as small as it was at discovery, in 1812. It was then regarded as a faint object. Were it not for the overwhelming testimony from other sources, one might doubt, on the ground of brightness, the identity between the present comet and that of 1812. The following rough ephemeris may be of interest: —

	α	δ	Light.		α	δ	Light.
1883.	h. m.	°		1884.	h. m.	°	
Dec. 3	18 45	+ 45.7	.6	Feb. 1	0 34	− 28.3	2.3
" 13	19 37	+ 41.7	1.0	" 11	1 02	− 37.2	1.5
" 23	20 41	+ 33.9	1.8	" 21	1 23	− 43.7	1.0
1884.		′					
Jan. 2	21 53	+ 22.1	3.5	Mar. 2	1 43	− 48.5	.6
" 12	23 01	+ 2.5	4.1	" 12	2 02	− 53.0	.4
" 22	23 53	− 15.2	3.0	" 22	2 26	− 56.2	.4

The identity of the Pons comet of 1812 with comet *b*, 1883, was announced in an 'associated press' despatch from the Dudley observatory on the evening of Sept. 19. LEWIS BOSS.

Sept. 21, 1883.

Massachusetts institute of technology, Boston, Mass.

Extension of the course in biology. — Advantage is at once to be taken of the extension in the building accommodations, and the improvement in the financial resources of the institute, to greatly enlarge the space heretofore given to biological work, and to increase the instructing staff of this department of the school.

The removal of the physical laboratory to the new building on Clarendon Street affords the long-desired opportunity for the expansion of the biological laboratory, heretofore confined to a single small room in the